IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

Health Discovery Corporation Plaintiff, v. Intel Corporation Defendant.	Civil Action No. 6:22-cv-356-ADA The Honorable Alan D Albright U.S. Magistrate Judge Derek T. Gilliland **JURY TRIAL DEMANDED**

PLAINTIFF'S RESPONSE TO DEFENDANT'S
MOTION FOR JUDGMENT ON THE PLEADINGS

TABLE OF CONTENTS

TABLE OF AUTHORITIES

Cases

Statutes

Rules

Regulations

I. INTRODUCTION

The Court should deny Defendant Intel Corporation's ("Intel") Motion for Judgment on the Pleadings. Plaintiff Health Discovery Corporation ("HDC") alleges additional facts in its re-filed complaint that demonstrate the subject matter eligibility of its patents under both steps of the *Alice* test. Intel's Motion fails to prove otherwise with clear and convincing evidence.

In the Court's prior analysis, the Court focused on four recent Federal Circuit decisions that provide guidelines under the first step. These decisions paid particular attention to whether claims were directed to a specific improvement in relevant technology and turned on whether the court characterized the relevant technology itself as an abstract idea. Intel admitted in its opening brief that HDC's patents disclose an improved support vector machine ("SVM") tool. The only disputed issue under the first step is whether an SVM may constitute a relevant technology that is more than an abstract idea. But, in sworn statements to the USPTO, Intel argued fervently that this very subject matter is, in fact, patent eligible.

HDC alleges additional facts in its re-filed complaint that fit squarely within the framework provided by the *CardioNet* and *Koninklijke* decisions supporting eligibility as a technological improvement and distinguish the claimed subject matter from the *SAP* and *Stanford II* decisions that concern mere improvements in mathematical techniques or resulting data. Specifically, HDC alleges that its support vector machine – recursive feature elimination ("SVM-RFE") patents claim a process for improving an SVM as a tool for data classification, which is a real-world instrument with real-world consequences. Rather than merely claiming an improvement in the mathematical algorithms underlying an SVM or its resulting data, SVM-RFE recreates an SVM during each iteration through ranking and elimination of features according to associated feature weights. Additionally, the USPTO has granted many other patents that cover improvements to SVMs. These

facts plausibly demonstrate that, although an SVM is based on underlying mathematical algorithms, an SVM is not *de jure* an abstract idea that categorically precludes patent protection. With Intel's admission, these facts are more than sufficient to defeat Intel's Motion for Judgement on the Pleadings, and the Court accepts these facts as true for a motion under Rule 12(c) .

Even assuming that the Court reaches step two of the analysis, HDC has alleged additional facts explaining how the claimed process was not well-understood, routine, or conventional. In particular, HDC alleges how SVM-RFE improved upon conventional feature selection methods for SVMs. These facts also independently suffice to defeat Intel's Motion.

Intel's contradictory statements to the USPTO during prosecution of its own SVM-RFE patent only further confirm that the Court should deny Intel's Motion. HDC and Intel bitterly fought at the USPTO for the rights to the SVM-RFE technology. When Intel was prosecuting its own SVM-RFE patent, Intel made sworn statements to the USPTO in favor of subject matter eligibility, asserting that its claims covered a "practical application" of SVM-RFE technology and that a feature ranking list produced by the technology was a "concrete result." Having lost to HDC at the USPTO, Intel now flip-flops on the issue and argues the exact opposite to the Court in an attempt to destroy HDC's patent rights. Intel should not be heard to contradict its own sworn positions. And, Intel cannot justify its change in position by arguing that *Alice* presented a substantial change in law. The premise that Intel relies upon in its Motion, that mathematical algorithms (without more) are ineligible subject matter, was true before *Alice* and did not change with *Alice*. Given Intel's contradictory statements under oath, Intel should not be able to meet its burden under Rule 12(c).

Intel's Answer to the complaint does nothing to change the subject matter eligibility analysis at the pleading stage. If anything, Intel's Answer demonstrates that there are disputed

issues of fact regarding the subject matter eligibility of HDC's patents. Accordingly, the Court should deny Intel's Motion for Judgment on the Pleadings.

II. BACKGROUND

HDC accuses Intel of infringing four patents: U.S. Patent Nos. 7,117,188 ("the '188 Patent"), 7,542,959 ("the '959 Patent"), 8,095,483 ("the '483 Patent"), and 10,402,685 ("the '685 Patent") (collectively, "HDC's Patents"). Dkt. 1, Complaint, at 15-19. Each of HDC's Patents relates to an innovative technology ("SVM-RFE") for improving support vector machines ("SVMs") by recursively eliminating features ("RFE"). *Id.* SVMs classify data sets according to features of the data. But SVMs themselves were not designed to evaluate the importance of the features for prediction and used large amounts of computer resources, limiting their usefulness. '188 patent at 4:4-60. SVM-RFE fine-tunes an SVM to efficiently perform. *Id*. at 29:63-30:30. Tuning is performed by recursively training the SVM, ranking the features according to their respective weight vectors, and then eliminating the lowest ranked feature(s). *Id.* For the subject matter eligibility analysis, the '188 patent is representative.

An SVM is a classifier that attempts to map data sets to one of two groups or categories in such a way as to maximize the "distance" between the groups. *Id*. at 64:43-47. This classification is based on one or more features of each data set. The SVM is first trained to perform the classification using examples with known outcomes (that is, examples that are known to belong to one group or the other). Once trained, the SVM can be used to classify data sets for which the proper group assignment is unknown. *See generally*, *id*. at 3:30-43; 4:4-34. SVMs thus represent "a powerful tool to identify predictive models or classifiers, not only because they accommodate sparse data but also because they can classify groups or create predictive rules for data that cannot be classified by linear decision functions." Exhibit A, Sanz et al., *SVM-RFE: selection and*

visualization of the most relevant features through non-linear kernels, BMC BIOINFORMATICS, 2018, at 2.

Although "powerful tools," SVMs are "complex" and historically, SVMs were geared towards creating classifiers based on all available variables, and did not allow assessing variable importance." *Id*. Further, some classifiers are prone to "overfitting," particularly where the number of features in each example is large. *Id*. at 391. Overfitting refers to a classifier that has been trained such that while it very accurately separates a set of training patterns into the correct categories, it does not generalize well to new examples. '188 patent at 25:29-37; '959 patent at 26:20-33.

Reducing the number of features relied upon for the classification is one approach for reducing the risk of overfitting a classifier. Exhibit B, Guyon et al., *Gene Selection for Cancer Classification using Support Vector Machines*, MACHINE LEARNING 46, 391 (2002) (the "Guyon Paper"). However, designing an optimal feature reduction approach for a *particular* classifier is a challenging problem that requires insights about the "heuristics, biases, and tradeoffs" of the classifier, the types of patterns being classified, and how these factors interact. Exhibit C, Kohavi et al., *Wrappers for feature subset selection*, ARTIFICIAL INTELLIGENCE 97, 273 (1997).

By 2018, "there [were] three categories of methods to assess importance of variables in SVM: filter, wrapper, and embedded methods." Exhibit A at 2. "The gold standard of wrapper methods is recursive feature elimination (RFE) proposed by Guyon et al." *Id*. It is this "gold standard" that is claimed in the '188 patent.

The SVM-RFE process can be understood with reference to Figure 2 of the '188 patent. Briefly, in method **200**, a training data set is collected at step **203** and is applied to an SVM with a selected decision function or kernel at step **208**. The kernel is a function that maps inputs to a required output to arrive at the classification of the input. Different kernels will cause an SVM to

produce varying degrees of quality in the output for a given set of input data. At step **210**, the SVM is trained using the training data to generate an optimal hyperplane (that is, an optimal separation of the classes). Then, at step **216** a determination is made as to whether the SVM was trained in a desirable manner. Based on the conclusion, the kernel selection may be adjusted (steps **222**, **224**) and the process repeated from step **208** using the training data. When the desired training has been achieved, the method advances to step **226**, where live data is collected and subsequently applied to the modified, since-trained SVM for classification. '188 patent at 15:14 – 17:4.

The invention described in the '188 patent is particularly concerned with the problem of "feature selection." *Id*. at 29:29 *et seq*. The "features" are the components of an input data set. *Id*. at 24:66 – 25:2. Feature selection is the process of reducing the number of input variables when developing a predictive model, *e.g.*, a classifier such as an SVM. Feature selection is premised on the notion that the data being evaluated contains some features that are either redundant, irrelevant or less important and can thus be removed without incurring much loss of classification accuracy. It is desirable to reduce the number of input variables to both reduce the computational cost of modeling and, in some cases, to even improve the performance of the model. When the number of features is very large, comprehensive feature selection techniques are impractical, *id*. at 25:56-63, so the inventors of the '188 patent devised a technique "to use the weights of a classifier to produce a feature ranking with an SVM." *Id*. at 28:14-16; *see also id*. at 27:25-32. That technique employed recursive feature elimination (RFE), a term coined by the inventors, in which the classifier is trained, a ranking criterion for the features is computed, and the features with the smallest ranking criteria are recursively eliminated. *Id.* at 27:62-55; *see also id.* at 29:28-59 (providing a pseudocode sequence for the application of RFE to an SVM using feature weight magnitude as a ranking criterion). This application of RFE to an SVM is recited in claim 1 of the '188 patent:

> 1. A computer-implemented method for identifying patterns in data, the method comprising:
> (a) inputting into at least one support vector machine of a plurality of support vector machines a training set having known outcomes, the at least one support vector machine comprising a decision function having a plurality of weights, each having a weight value, wherein the training set comprises features corresponding to the data and wherein each feature has a corresponding weight;
> (b) optimizing the plurality of weights so that classifier error is minimized;
> (c) computing ranking criteria using the optimized plurality of weights;
> (d) eliminating at least one feature corresponding to the smallest ranking criterion;
> (e) repeating steps (a) through (d) for a plurality of iterations until a subset of features of pre-determined size remains; and
> (f) inputting into the at least one support vector machine a live set of data wherein the features within the live set are selected according to the subset of features.

Id. at 75:34-55.

At a high level, SVM-RFE is a process for improving an SVM as a tool for classification of data. An SVM is used to classify examples of data (called patterns) drawn from two categories into the appropriate category. *Id*. at 28:47-67. Each pattern is made up of a set of features and the SVM finds a separation that divides the patterns into the two categories based on the content of the features. *Id*. The SVM-RFE process involves recursively pruning away those features that contribute the least to the classification decision. *Id*. at 29:28-30. The result yields an SVM that can classify a new pattern using a reduced set of features. *Id*. at 27:25-32. In effect, the once generic SVM has been fine-tuned into a specific classification instrument for the data set being evaluated. The feature pruning is performed on the basis of ranked feature weights of the classifier. *Id*. at 29:28-30.

Using one example from the ’188 patent, a scientist may wish to identify the genes involved in colon cancer. *Id*. at 24:46-60; 34:9. In this example, the inventors considered 62 patterns, each pattern representing 2,000 genetic measurements of a single patient. *Id*. at 34:11-20. Each feature was a gene expression value indicating a magnitude for that gene’s activity in the patient. *Id*. The classes represented the disease outcome for the patient—*i.e.*, whether the patient had colon cancer

or not. SVM-RFE was used to discover four genes predicted to be involved in the genetic mechanism of colon cancer. *Id*. at 36:45-53. The technique additionally surfaced 7 genes having known biological functions that are relevant to colon cancer from the initial set of 2,000 genes. *Id*. at 44:36-45:21. SVM-RFE is particularly useful in cases like this where the patterns represent a large array of features, but it is not known which subset of the features are responsible for the example's membership in a category (here, the corresponding patient's disease outcome of colon cancer or not). This is a concrete outcome, the result of SVM-RFE being a more efficient, accurate machine for classification of cancer risk.

In SVM-RFE, not only does the technique yield a classifier that avoids overfitting, but the pruning process efficiently reveals relevant features and is responsive to the case where subsets of features contribute differently to the classification, rather than assuming all features are independent. *Id*. at 48:66 – 49:10; 27:62 – 28:12. For example, certain subsets of genes do not have independent activity, and the activities of certain genes may be correlated with a particular classification in a training set while having limited relevance to the biological mechanism of interest. *See, e.g*., *id*. at 26:44-48. Importantly, SVM-RFE allows researchers to not just obtain a more efficient classifier that makes accurate classifications using a reduced set of features, but also to understand why the classifier would make a particular classification. In this regard, SVM-RFE yields the importance of particular features to the classification, providing a concrete result for researchers and permitting further investigation of those leads.

These advantages have led SVM-RFE to become an important technique that continues to be used and praised to this day. Even the references quoted by Intel in its IPR petitions recognize the importance of Guyon's and Weston's contributions. Citing the seminal 2002 Guyon Paper as

reference 12 in the passage below, a 2014 article by Huang et al. favorably compares SVM-RFE to other methods of feature selection:

> The common methods of feature selection include backward feature selection (BFS), forward feature selection (FFS), and ranker [11]. Another feature selection method, support vector machine recursive feature elimination (SVM-RFE), can filter relevant features and *remove relatively insignificant feature variables in order to achieve higher classification performance* [12]. The research findings of Harikrishna et al. have shown that computation is simpler and can more effectively improve classification accuracy in the case of datasets after SVM-RFE selection [13–15]."

Huang et al., *SVM-RFE Based Feature Selection and Taguchi Parameters Optimization for Multiclass SVM Classifier*, THE SCIENTIFIC WORLD JOURNAL, Vol. 2014, Article ID 795624 (2014) (emphasis added for text quoted in Intel's IPR petition in italics).

Intel's past statements supporting the subject matter eligibility of SVM-RFE

Intel knows the importance of SVM-RFE, and in 2005, filed its own patent application directed to "A Recursive Feature Eliminating Method Based on a Support Vector Machine." That application eventually issued as U.S. Patent 7,685,077 ("Intel's '077 Patent"). Exhibit D. It issued only because during prosecution of the underlying patent application, in an effort to demonstrate patent eligibility, Intel explained to the U.S. Patent and Trademark Office ("USPTO") patent examiner that the method "would generate a feature ranking list which would be used for data recognition in the future." Intel's '077 Patent file history, Office Action Response of June 2, 2009, at 11. Intel characterized this as a "practical application" of SVM-RFE technology, stating that "the feature ranking list can help to detect if a person has a disease or not by checking his/her gene expression with the gene feature ranking list. . . ." *Id.* Intel also recognized and agreed that SVM-RFE "can be used in other applications of data recognition. For example it can be used for face recognition with [a] face feature ranking list. . . . [T]hat final result [e.g., disease detection and face recognition] of the data recognition with the feature ranking list. . . meets the requirement of being

'useful, tangible, and concrete' . . . ." *Id.* at 11-12. These are Intel's *own* statements about the eligibility of this very subject matter. As a result of HDC's interference proceeding, the USPTO eventually revoked Intel's '077 Patent because Intel conceded that the technology covered by the '077 Patent was first invented by HDC's Guyon and Weston (HDC's Patents). Exhibit E, '077 Patent Interference Proceeding, Decision on Motions (Feb. 27, 2019). HDC alleges all of these facts in its refiled complaint.

Other SVM patents

The USPTO has issued many other patents that claim improvements to an SVM. *See e.g.*, U.S. Patent No. 10,891,522 to Moussaffi (Shutterfly), entitled "System for support vector machine prediction;" U.S. Patent No. 10,360,517 to Koch et al. (SAS Institute), entitled "Distributed hyperparameter tuning system for machine learning;" U.S. Patent No. US9569401 to Pechyony et al. (Akamai Technologies), entitled "Parallel training of a support vector machine (SVM) with distributed block minimization;" U.S. Patent No. 9,495,647 to Zhao et al. (SAS Institute), entitled "Acceleration of sparse support vector machine training through safe feature screening;" and U.S. Patent No. 9,443,169 to Duan (Xerox), entitled "Object classification with constrained multiple instance support vector machine."[1]

Procedural history

HDC filed its original complaint against Intel alleging infringement of HDC's Patents on July 23, 2020, case no. 6:20-cv-00666-ADA. Intel filed a Rule 12(b)(6) motion to dismiss for failure to state a claim on October 19, 2020. Dkt. 12 in case no. 6:20-cv-00666-ADA. The Court

[1] Although HDC did not plead the existence of these other SVM patents in its re-filed complaint, the Court may properly take judicial notice of the existence of these patents under Federal Rule of Evidence 201(b)(2), which provides that the Court may take judicial notice of a fact that "can be accurately and readily determined from sources whose accuracy cannot reasonably be questioned." The existence of these patents covering improvements to SVMs is readily determined by the mere grant and publication of these patents by the USPTO and cannot reasonably be questioned.

concluded in its Order on December 27, 2021, that HDC "failed to plead allegations supporting the eligibility of the asserted claims" and dismissed HDC's original complaint without prejudice. *See* Dkt. 66 in case no. 6:20-cv-00666-ADA at 24.

While HDC's appeal of the dismissal was still pending, HDC filed this new complaint against Intel, case no. 6:22-cv-356-ADA, alleging infringement of the same patents. Dkt. 1. This re-filed complaint, as discussed *supra*, includes substantially more factual allegations in support of the subject matter eligibility of its patents. HDC then dropped its appeal of the Court's dismissal of its original complaint. Dkt. 69 in case no. 6:20-cv-00666-ADA.

Intel now moves under Rule 12(c) for judgment on the pleadings. Dkt. 33. Intel re-asserts that HDC's patents are "directed to the abstract idea of using mathematical algorithms to analyze and report data, and they lack an inventive concept." *Id.* at 1. Intel relies heavily on the Court's prior analysis but ignores that HDC's re-filed complaint contains substantial additional factual allegations directly relating to the issues briefed here. *See Id.* at pars. 9-13. Intel also admitted that HDC's patents disclose an improved SVM tool. *Id.* at 15.

III. LEGAL STANDARDS

A. Rule 12(c) Motion for Judgment on the Pleadings

A motion for judgment on the pleadings under Federal Rule of Civil Procedure 12(c) is only intended "to dispose of cases where the material facts are not in dispute and a judgment on the merits can be rendered by looking to the substance of the pleadings and any judicially noticed facts." *Hebert Abstract Co., Inc. v. Touchstone Properties*, 914 F.2d 74, 76 (5th Cir. 1990). Rule 12(c) motions are treated the same as a motion to dismiss under Rule 12(b)(6). *See Johnson v. Teva Pharms. USA, Inc.*, 758 F.3d 605, 610 (5th Cir. 2014). The primary focus is whether, in the light most favorable to the plaintiff, the complaint states a valid claim for relief. *See United States*

v. 0.073 Acres of Land, 705 F.3d 540, 543 (5th Cir. 2013). The Rule 12(c) "'inquiry focuses on the allegations in the pleadings' and not on whether the 'plaintiff actually has sufficient evidence to succeed on the merits.'" *Ackerson v. Bean Dredging LLC*, 589 F.3d 196, 209 (5th Cir. 2009) (quoting *Doe v. MySpace, Inc.*, 528 F.3d 413, 418 (5th Cir. 2008)).

"Pleadings should be construed liberally, and judgment on the pleadings is appropriate only if there are no disputed issues of fact and only questions of law remain." *Great Plains Tr. Co. v. Morgan Stanley Dean Witter & Co.*, 313 F.3d 305, 312 (5th Cir. 2002). The Court is restricted to the pleadings and must accept all allegations as true. *Id.* at 313. "When there are well-pled factual allegations, a court should assume their veracity and then determine whether they plausibly give rise to an entitlement to relief." *Ashcroft v. Iqbal*, 556 U.S. 662, 679 (2009). Indeed, patent eligibility can only be determined at the pleading stage "when there are no factual allegations that, taken as true, prevent resolving the eligibility question as a matter of law." *Aatrix Software, Inc. v. Green Shades Software, Inc.*, 882 F.3d 1121, 1125 (Fed. Cir. 2018).

B. Patent Subject Matter Eligibility Under § 101

Patent eligible subject matter includes "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." 35 U.S.C. § 101. The judicial exceptions are for "[l]aws of nature, natural phenomena, and abstract ideas." *Alice Corp. Pty. v. CLS Bank International*, 134 S. Ct. 2347, 2354 (2014). Intel only argues the last of these judicial exceptions. An issued patent is "presumed valid." 35 U.S.C. § 282(a). This presumption extends to subject matter eligibility under § 101. *See Cellspin Soft, Inc. v. Fitbit, Inc.*, 927 F.3d 1306, 1319 (Fed. Cir. 2019). Invalidating a patent under § 101 requires "clear and convincing evidence" that the patent covers patent-ineligible subject matter. *See Microsoft Corp. v. i4i Ltd. P'ship*, 564 U.S. 91, 95 (2011).

Under *Alice*, the Supreme Court mandated a two-part test for subject matter eligibility. *Alice*, 134 S. Ct. at 2347. The test requires, at step one, that the Court determine whether the patent is directed to a patent ineligible concept (such as an abstract idea). *Id.* at 2355. If the patent is directed to an ineligible concept, then, at step two, the Court will determine whether elements of the invention either individually or as an ordered combination, demonstrate an inventive concept, add substance, or "transform the abstract idea into a patentable invention." *Id.* at 2357-59.

IV. THE COURT SHOULD DENY INTEL'S MOTION FOR JUDGMENT ON THE PLEADINGS BECAUSE INTEL HAS FAILED TO PROVE THAT THERE ARE NO DISPUTED ISSUES OF FACT

HDC alleges substantial additional facts in its re-filed complaint that specifically describe how HDC's SVM-RFE Patents claim a technological and non-abstract improvement in SVMs. In particular, HDC's Patents improve an SVM classifier tool itself rather than merely improving mathematical algorithms underlying an SVM or its resulting data. Taken as true, these facts materially affect the analysis under both steps of the *Alice* test and plausibly support the subject matter eligibility of HDC's Patents. Intel's Motion at most establishes that there are disputed issues of fact. Intel has not met their burden to prove invalidity by clear and convincing evidence. This is not enough to prevail on a motion for judgment at the pleading stage. *See Aatrix*, 882 F.3d at 1125.

A. *Alice* step one: HDC alleges facts that plausibly support that its claims are directed to an improvement in relevant technology, not to an abstract idea

HDC's Patent claims are eligible under step one of *Alice* because they are directed to a "specific means or method that improves [a] relevant technology." *See McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1314 (Fed. Cir. 2016). Courts look to the specification to determine the focus of the claimed advance, specifically looking at the problem the inventors were trying to solve and how the invention solves it. *Uniloc USA, Inc. v. LG Electronics USA, Inc.*, 957

F.3d 1303, 1305 (Fed. Cir. 2020); *see also Visual Memory LLC v. NVIDIA Corp.*, 867 F.3d 1253, 1258 (Fed. Cir. 2017) (it is "appropriate to consider the technological improvement embodied in the claims at step one . . . because *Alice* does not 'broadly hold that all improvements in computer-related technology are inherently abstract.'").

The mere fact that a claim involves a mathematical technique is insufficient to render a claim ineligible. *See XY, LLC v. Trans Ova Genetics*, 968 F.3d 1323, 1332-33 (Fed. Cir. 2020). In *XY*, the improvement concerned the use of certain mathematical equations to reconfigure data concerning particles separated by flow cytometry. *Id.* at 1326-27. The specific mathematical equations provided for rotating the data in order to increase spatial separation between data points, making it possible to discriminate between the particles. *Id.* at 1328. The Federal Circuit reversed a district court's decision holding the patent ineligible under step one of *Alice*. The Federal Circuit found the claims to be directed to a specific improvement to a flow cytometry method, thereby facilitating classification and sorting of each individual particle more accurately than any prior art method. *Id.* at 1332-33. Although mathematical equations were employed to implement the improvement, the claims are directed to an improvement of the method itself. *Id.*

In this Court's prior analysis under step one, the Court referenced four other Federal Circuit cases that discussed whether claims are directed to an improvement in relevant technology. *See* Dkt. 66 in case no. 6:20-cv-00666-ADA at 9. These cases turned on whether the court characterized the relevant technology itself as an abstract idea. *Id.* Intel admitted in its opening brief that HDC's patents disclose an improved SVM tool. Dkt. 33 at 14-15. The only disputed issue under the first step is whether an SVM may constitute a relevant technology that is more than an abstract idea.

In *CardioNet, LLC v. InfoBionic, Inc.*, the Federal Circuit reversed a decision finding a technology for monitoring the variability of an irregular heartbeat to distinguish atrial fibrillation and atrial flutter to be ineligible. 955 F.3d 1358, 1362 (Fed. Cir. 2020). The court instead found the claims to be directed to "an improved cardiac monitoring device" rather than an abstract idea. *Id.* at 1368. The court credited the specification for disclosing technological improvements in calculating "variability in the beat-to-beat timing" and then relating it to atrial fibrillation and atrial flutter and faulted the district court for oversimplifying the claims. *Id.* at 1368, 1371.

Likewise, the Federal Circuit in *Koninklijke KPN N.V. v. Gemalto M2M GmbH* reversed a district court decision that found a claimed system for detecting errors during data transmission ineligible. 942 F.3d 1143, 1145 (Fed. Cir. 2019). The court held the claim to be patent-eligible because it was "directed to a non-abstract improvement in an existing technological process. . ." *Id.* at 1150. Significantly, the accused infringer did "not dispute that varying the way check data is generated provides an improvement to an existing technological process." *Id.* 1151. The court credited the claims as "recit[ing] a specific implementation of varying the way check data is generated that improves" over prior art error detection systems. *Id.* at 1150.

This Court indicated that it would likely find HDC's Patents patent-eligible under *CardioNet* and *Koninklijke*, even without the additional factual allegations in HDC's re-filed complaint. Dkt. 66 in case no. 6:20-cv-00666-ADA at 20. With those additional facts in hand, *CardioNet* and *Koninklijke* apply.

By contrast, the Federal Circuit in *In re Bd. of Trustees of Leland Stanford Junior Univ.* (hereinafter *Stanford II*) held claims covering computerized statistical methods for determining haplotype phase to be ineligible under step one. 991 F.3d 1245, 1247 (Fed. Cir. 2021). The claims used a particular type of hidden Markov model, a mathematical algorithm, as compared to

conventional techniques which used different types of hidden Markov models. *Id.* The court focused on the mathematical nature of the claims, noting that "the different use of a mathematical calculation, even one that yields different or better results, does not render patent eligible subject matter." *Id.* at 1251 (Fed. Cir. 2021). The court found that the claimed improvement was "merely an enhancement to the abstract mathematical calculation of haplotype phase itself." *Id.*

And in *SAP Am., Inc. v. InvestPic, LLC*, the Federal Circuit held that claims "for performing certain statistical analyses of investment information" were ineligible. 898 F.3d 1161, 1163 (Fed. Cir. 2018). The claims used a different mathematical technique to analyze investment information which did not assume a normal probability distribution. *Id.* at 1164. The Court reasoned that the claims focused on an "improvement in a mathematical technique" and not "a physical-realm improvement," *Id.* at 1167–68, even though the analyses could be applied to real-life investments. *Id* at 1158.

This Court described the decisions in *Stanford II* and *SAP* as incompatible with the decisions in *CardioNet* and *Koninklijke*. Dkt. 66 in case no. 6:20-cv-00666-ADA at 18-20. The Court elected to follow *Stanford II* and *SAP* instead of *CardioNet* and *Koninklijke* because it found the subject matter more similar to the subject matter of HDC's Patents. *Id.* at 20.

However, as demonstrated by the additional facts HDC alleges in its re-filed complaint, SVM-RFE is readily distinguishable from the technologies in *Stanford II* and *SAP*. SVM-RFE does not merely improve a mathematical technique as in *Stanford II*, where the claimed advance merely substituted a different and more effective algorithm in the claimed process. Nor does SVM-RFE merely improve the quality of the data produced as in *SAP*.

Instead, HDC's claims are in line with *CardioNet*, *Koninklijke*, and *XY*. As a representative example, claim 1 of the '188 patent fits squarely within the patent-eligible framework provided by

these cases. The claim recites a process for modifying an SVM—a kind of classifier—using the SVM-RFE process. '188 patent at 29:28-62. Intel itself characterized this modification to the USPTO as a "concrete result." S*ee* Intel's '077 Patent File History, Office Action Response of June 2, 2009. Although the claimed SVM-RFE process may apply algorithms to effect such an improvement, this is insufficient under *XY* to render the claims ineligible. The claimed process does not merely use an SVM as a tool to perform or automate a classification function (*e.g.*, whether a particular data set is indicative of a patient with a disease condition or not). Rather, it is a process of modifying the tool used to make that classification decision. The result of the process is an improved tool. The claims are not directed to an abstract idea, and thus remain patentable.

The recited process begins with training data being input into an SVM. '188 patent, claim 1, step (a). That SVM is characterized by a particular decision function having a set of weights. Steps (b) – (d) then recite modifications to the SVM. First, the weights that make up the decision function are optimized and used to compute ranking criteria. Then, a feature that corresponds to the smallest ranking criterion is eliminated. This has the effect of altering the decision function of the SVM. In other words, the SVM at step (d) is a different SVM than began the process in step (a). This procedure iterates, each time creating a new SVM as the weights are optimized and ranked and a feature corresponding to the smallest ranking criterion is eliminated, until an SVM that includes "a subset of features of pre-determined size remains." This results in an improved SVM, different than the original one, that can now be used on the "live" data set for which classification determinations are needed. *See* '188 patent at 15:14 – 17:4.

This is completely different from the situations presented by *Stanford II* or *SAP*, in which certain information is selected, analyzed, and then reported, or results of the analysis displayed. Claim 1 of the '188 patent recites actual improvements to the SVM classifier tool used to perform

the analysis. While the process of these improvements is algorithmic in nature, the claim is not merely an improvement of a mathematical technique. Rather, it is an improvement in the functionality of the SVM classifier, a physical-world instrument with real-world outcomes. The SVM that is the result of the claimed process is one that is specially crafted for the classification task to be performed by including only the subset of features of pre-determined size that has been determined through the recited optimization process. This is distinct from claims found to be directed to abstract ideas which only provide data of an improved quality or nature. Here, it is not the data that is improved, it is the machine used to analyze the data that is improved.

As Intel itself explained in sworn statements to the USPTO during prosecution of its '077 patent, the feature ranking list arrived at through the use of SVM-RFE is a *concrete result* that allows researchers to further investigate data. Intel's '077 Patent File History, Office Action Response of June 2, 2009; *see also* Intel's '077 Patent File History, Final Rejection of July 31, 2009, at 16-17 (with the Examiner agreeing that the specification recites a practical application) (Exhibit F); 37 C.F.R. § 11.18 (by presenting a paper to the USPTO, the signer warrants the veracity of statements made therein under the penalties of 18 U.S.C. § 1001). In sum, claim 1 of the '188 patent is directed to a specific technological improvement in the SVM tool, and the written description confirms this by reporting the myriad advantages of the improved SVM.

Furthermore, claim 1 of the '188 patent involves more than the performance of well-understood, routine, and conventional activities previously known to the industry. The technique for improving an SVM that is recited in this claim affords two advances. First, use of ranked feature weights enables an efficient process for pruning features by using parameters already computed during the training of the underlying SVM classifier. Second, the ranked feature weights provide users of the process with insight into the relevance of various features to the classification itself.

In developing this process, the inventors discovered that the parameters computed during the training of the SVM could be very efficiently used to compute a different parameter—the "feature weight"—that was correlated with the contribution of a feature to the SVM classification.

Although they are powerful tools, SVMs had only limited initial popularity among researchers as they are complex and were originally geared towards creating classifiers based on all available variables and did not allow assessing variable importance. The process of improving an SVM recited in claim 1 of the '188 patent addressed both drawbacks. First, the process creates an SVM that operates effectively on fewer than all available variables through feature elimination according to ranked feature weights. Second, the process allows assessment of variable importance because the ranking uses parameters computed during the training of the underlying SVM classifier. That is, the recited process provides a ranked list with variables ordered according to their relevance. The process also provides overall efficiencies because it avoids the need to retrain the classifier for every candidate variable to be eliminated. This reduces the computational burden associated with other feature elimination techniques. These techniques and advantages were not well-understood, routine, or conventional activities previously known to the industry.

Intel commits the cardinal sin in its subject matter eligibility analysis of overgeneralizing the claims. *See Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1337 (Fed. Cir. 2016). Intel ignores the additional facts HDC alleges in its re-filed complaint that support that the claimed process improves the SVM tool itself. Instead, in service of its step one allegations, Intel analyzes the claims from a 10,000-foot viewpoint, ignoring the specific details of the claims.[2]

[2] While the Court briefly discussed the issue of preemption in a footnote in its prior opinion, in this case there is no risk of preemption. The claims are limited to a specific process for optimizing a support vector machine by recursively eliminating features based on feature weights.

Intel also posits in its Motion that "even if HDC's allegations could change the eligibility analysis, they are conclusory [. . .] ," citing *Simio, LLC v. FlexSim Software Prods.*, Inc., 983 F.3d 1353, 1365 (Fed. Cir. 2020). Dkt. 33 at 15. But the additional facts in HDC's complaints are not conclusory—they are based on tangible evidence cited in the Complaint. The argument Intel cites from *Simio* was raised in the context of a denial of a motion for leave to amend a complaint. The patent at issue in *Simio* provided an abstract idea that allegedly improved the "processing speed" of a user of a computer, not the computer itself. *Simio* is clearly distinguishable. Moreover, the mere consideration that HDC's factual allegations could change the analysis proves the existence of a plausible factual dispute that should defeat Intel's Motion.

The claims of HDC's patents are patent-eligible under step one.

B. *Alice* step two: HDC alleges facts that plausibly support that its claims have an inventive concept beyond what was well-understood, routine, or conventional

Even if the Court reaches step two, HDC alleges additional facts explaining how the claimed SVM-RFE process was not well-understood, routine, or conventional. At step two, the Court considers whether the claimed elements, individually and as an ordered combination, recite an inventive concept. *See, e.g.*, *Cellspin* 927 F.3d at 1316 (citing *Alice*, 573, U.S. at 217). The declared abstractness provides a baseline for the analysis. *See Cosmokey Sols. GMBH & Co. KG v. Duo Sec. LLC*, 15 F.4th 1091, 1097 (Fed. Cir. 2021). An inventive concept will exist when the claims recite more than an application of the identified abstract idea using conventional techniques. *Cellspin* 927 F.3d at 1316. The challenger bears the burden to show that the claims as an ordered combination were routine, conventional, and well understood. *Berkheimer v. Hewlett-Packard Co.*, 881 F. 3d 1360, 1369 (Fed. Cir. 2018). In this case, if the Court reaches step two, Intel's dearth of clear and convincing evidence, in addition to the additional facts alleged by HDC in its re-filed complaint that the court must assume to be true, dooms its motion. *See Id.* at 1368-69. In particular,

HDC alleges facts that explain how SVM-RFE improved upon conventional feature selection methods for SVMs.

Assuming for purposes of the step two analysis that SVM-RFE is an abstract idea, the baseline level of abstraction for the step two analysis should be limited to the concept of recursively eliminating features in an SVM. *See Cosmokey*, 15 F.4th at 1097. Rather than applying this correct level of abstraction, Intel improperly captures the entire claim. Dkt. 33, Intel's Motion, at 16. It overbroadly characterizes the abstract idea in its step two analysis as HDC's specific SVM-RFE implementation. But this level is too broad. The correct level of abstraction is recursively eliminating features in an SVM.

As described above, but also relevant to the step two analysis, the asserted claims involve more than the performance of well-understood, routine, and conventional activities previously known to the industry that go beyond the concept of recursively eliminating features in an SVM. Use of ranked feature weights enables an efficient process for pruning features and the ranked feature weights provide users of the process with insight into the relevance of various features to the classification itself. *See* '188 Patent at 27:25-32, 28:14-16. This is a specific way to recursively eliminate features that is substantially more than the concept of recursive feature elimination itself.

These facts are also independently sufficient to defeat Intel's Motion under step two.

V. CONCLUSION

For all these reasons, the Court should deny Intel's Motion for Judgement on the Pleadings.

Dated: September 1, 2022

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on September 1, 2022, the foregoing was filed electronically in compliance with Local Rule CV-5(b)(1) and served via the Court's electronic filing system on all counsel who have consented to electronic service.

/s/ William W. Flachsbart

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